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phase a number of chromatic bodies (presumably derivatives of the chromosomes) are distributed on the linin fibers, and subsequently aggregate to form the lobular nucleolus of the resting nucleus. The first spore wall is cuticularized from a very early period, and within it, at the equatorial rim, a plug of mucilage is deposited. The second spore wall is formed within the first wall, and is also cuticularized; at first it appears homogeneous, but subsequently is composed of three regions. The endospore (pectose and cellulose) is formed late, and is often separated from the second wall by a thin band of dark material.—J. M. C.

**Postelsia.**<sup>15</sup>—Four years ago the first volume under this title appeared,<sup>16</sup> containing seven papers by members of the Minnesota Seaside Station on the coast of Vancouver. The present volume is printed in the same handsome style, and also contains seven papers as follows: Observations on plant distribution in Renfrew district of Vancouver Island (pp. 1-132. *pls.* 1-11), by C. O. ROSENDAHL; The Conifers of Vancouver Island (pp. 133-212. *pls.* 12-15), by F. K. BUTTERS; Hepaticae of Vancouver Island (pp. 213-235), by ALEXANDER W. EVANS; Some western Helvellineae (pp. 236-244), by D. S. HONE; *Renfrewia parvula*, a new kelp from Vancouver Island (pp. 245-274. *pls.* 16-19), by ROBERT F. GRIGGS; A study of the tide-pools on the west coast of Vancouver Island (pp. 275-304. *pls.* 20-25), by ISABEL HENKEL; Some geological features of the Minnesota Seaside Station (pp. 305-347. *pls.* 26-33), by C. W. HALL.

The paper on plant distribution reaches the conclusion that the pteridophytes are poor in species for so moist a region, that the gymnosperms constitute the great mass of the vegetation, and that the monocotyledons are more important than the dicotyledons. The paper on conifers contains very interesting observations, treats *Picea*, *Tsuga*, and *Pseudotsuga* as sections under *Abies*, and organizes a key to the northwestern genera on the basis of foliage. *Renfrewia* is a new genus of kelps nearest to *Laminaria* and *Cymathere*.—J. M. C.

**Synapsis and reduction.**—From a study of the pollen mother cells of *Acer platanoides*, *Salomonina biflora*, *Ginkgo biloba*, and *Botrychium obliquum* CARDIFF draws the following conclusions.<sup>17</sup> Synapsis is a constant morphological character of the mother cell, and the unilateral position of the synaptic knot is probably due to gravity. Previous to synapsis the chromatin is in two or more threads which arrange themselves in pairs, longitudinally, and finally fuse during synapsis, but there is not a complete mingling of chromatin substance in the chromatic thread. The thread splits longitudinally in the first mitosis, probably along the line of previous fusion. The chromosomes are of different sizes and do not behave alike at the first mitosis.

<sup>15</sup> The year book of the Minnesota Seaside Station. 1906. pp. 364. *pls.* 33. Obtained from Josephine E. Tilden, Univ. Minn., Minneapolis. \$2.25.

<sup>16</sup> BOT. GAZETTE 34:468. 1902.

<sup>17</sup> CARDIFF, I. D., A study of reduction and synapsis. Bull. Torr. Bot. Club 33:271-306. *pls.* 12-15. 1906.

It is probable that at fertilization there is a nuclear but not a chromatin fusion, and that the paternal and maternal chromatin retain their identity throughout the sporophytic phase, finally fusing, in so far as they fuse at all, during synapsis. If this be true, the two important phenomena of fertilization—stimulus to growth and intermingling of ancestral characters—are widely separated, the stimulus to growth occurring when the nuclei fuse, and the mingling of characters being delayed until synapsis.—CHARLES J. CHAMBERLAIN.

**Nutrition of the gymnosperm egg.**—Miss STOPES and FUJII<sup>18</sup> have been investigating the nutritive relations of the surrounding tissues to the egg in gymnosperms. As is well known, about the “central cell,” and later about the egg, there is organized usually a very distinct jacket of nutritive cells, whose inner walls are conspicuously thickened and pitted. The authors find that the delicate walls of the endosperm cells are pitted in the same way; and that the large pits of the jacket cell-walls are closed by a membrane perforated only by plasmodesmen. This latter fact is the most interesting one of the paper, for it precludes the old notion of nuclear migration or of any transfer of solid material from the jacket cells to the egg. The jacket cells are regarded as glandular, secreting substances for the digestion of the starch and proteid granules stored in the endosperm. The statement is made in the summary that the jacket cells “are considered the phylogenetic homologues of the angiospermic antipodals,” a statement evidently based upon their similar function.—J. M. C.

**Ecological survey of Northern Michigan.**—Under the direction of C. C. ADAMS there has been published<sup>19</sup> the report of an ecological survey conducted by the University Museum of the University of Michigan in 1904. The regions selected were Porcupine Mountains in Ontonagon County, on the south shore of Lake Superior, and Isle Royale, an island near the Canadian shore. Especially significant is the report by A. G. RUTHVEN on the relation of the plants and animals of these regions to their environment. Lines of survey were run across the region examined, in such a way as to include examples of all the representative habitats. These habitats were then examined in as much detail as time permitted, and special attention was given to the relations of the “biota” to its environment. In this study attention was directed particularly to the forces and conditions composing the environment, in order that the dominant forces might be clearly recognized. The results are too numerous and detailed for mention, but the work is unique and extremely suggestive.—J. M. C.

**Ecology of algae.**—FRITSCH<sup>20</sup> has made a statement of some of the problems:

<sup>18</sup> STOPES, M. C. and FUJII, K., The nutritive relations of the surrounding tissues to the archegonia in gymnosperms. *Beih. Bot. Centralb.* 20:1-24. *pl. I.* 1906.

<sup>19</sup> An ecological survey in Northern Michigan. Prepared under the direction of CHAS. C. ADAMS. Publ. in Rep. State Geol. Survey for 1905. pp. 133. *figs. 21.* 1906.

<sup>20</sup> FRITSCH, F. E., Problems in aquatic biology, with special reference to the study of algal periodicity. *New Phytol.* 5:149-169. 1906.